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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

AHMED, SHAMIM

ART UNIT

PAPER NUMBER

1765

DATE MAILED: 01/02/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/819,787

Applicant(s)

CHAMBERLIN ET AL.

Examiner

Shamim Ahmed

Art Unit

1765

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 08 October 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 19-39 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 19-39 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
- a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

Response to Arguments

1. Applicant's arguments filed 10/08/03 have been fully considered but they are not persuasive. Applicants argue that Wang et al fail to disclose a polishing method using a polishing composition with a slurry comprising abrasive particles in combination of employing a pH of about 5 to about 11 along with selecting an oxidizing agent having a static etch rate on metal of less than 1000 Angstroms per hour.

In response to the applicant's argument, examiner states that the argument is not persuasive because Wang et al does teach a polishing slurry comprising an oxidizing agent (potassium iodate) (col.2, lines 32-41) and the pH of the polishing composition is about 1 to about 7 (col.3, lines 8-12) and the abrasive particles can be silica or alumina (col.2, lines, 23-26).

Examiner also states that it is true that Wang et al do not explicitly teach that the oxidizing agent has a static etch rate on metal of less than 1000 Angstroms per hour but this is an inherent property of the oxidizing agent because the oxidizing agent (potassium iodate) used by Wang et al is exactly same as the applicant's oxidizing agent (see the rejection).

Applicants also argue that none of the cited references suggest the invented slurry composition can polish both metal and silicon dioxide at substantially the same rates.

In response to applicant's argument, examiner states that the argued limitation is not claimed.

In reference to Wang et al's selecting the oxidizing agent, applicants argue that many of the oxidizing agents such as ferric nitrate, ammonium persulfate and hydrogen peroxide exhibit higher etch rates than the claimed one and none of the examples in Wang employ a slurry composition having a pH of at least about 5 along with the oxidizing agent.

In response, examiner states that the argument is not persuasive because Wang et al clearly teach that the preferable oxidizing agent is potassium iodate (col.2, lines 39-41), which is exactly same as the instant invention and will inherently provide the static etch rate on metal less than 1000 Angstroms.

Examiner, further states that the use of a preferred pH in examples do not exclude the use of other provability, wherein the reference teaches the pH of the slurry is maintain at about 1- about 7 (col.3, lines 8-12).

Applicants further, argue that Sakatani et al do not teach a method for polishing that employing a pH of about 5 to about 11 and an oxidizing agent having static etch rate on metal of less than 1000 Angstroms per hour.

In response, examiner states that the argument is not persuasive because Sakatani et al teach that the pH of the slurry composition is about 7 (col.3, lines 61-63) and the abrasive particles can be silicon oxide (silica) or aluminum oxide (alumina) and an oxidizing agent as iodate, which is same as the instant invention and inherently provide the same static etch rate on metal as claimed.

Examiner also state that selecting a preferred embodiment of an invention does not exclude the use of others, since the reference discloses the use of iodates, hydrogen peroxide, iron (III) nitrate can be used as an oxidizing agent (col.4, lines 3-11).

Therefore, the claims 19-39 are rejected as follows.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 19-24, 26-27, 32-33 and 37-38 are rejected under 35 U.S.C. 102(b) as being anticipated by Wang et al (5,770,103).

As to claim 19, Wang et al disclose a method for polishing metal, wherein the metal substrate is contacted with a polishing pad and slurry is used to polish the metal including abrasive particles and an oxidizing agent such as potassium iodate (col.2, lines 17-22 and lines 32-41 and example 1).

Wang et al also disclose that abrasive particles may be comprised of any of the oxides such as alumina, silica, ceria and zirconia at about 0.01 % to about 15 % by weight (col.2, line 23-31).

Wang et al further disclose that the pH of the slurry is maintain at about 1 to about 7 (col.3, lines 8-12).

Wang et al inherently teach that the property of the oxidizing agent such as the static etch rate on metal is less than 1000 Angstrom per hour because the oxidizing agent (potassium iodate) used by Wang et al is exactly same with the applicant's oxidizing agent.

As to claim 20, Wang et al teach that the oxidizing agent is present at about 0.01% to about 10% or 0.1 g/L to about 100 g/L (col.2, lines 36-39).

As to claim 21, Wang et al teach that the abrasive particles are present in the composition of about 0.01% to about 15% by weight (col.2, lines 26-27).

As to claims 22-23, the oxidizing agent comprises potassium iodate (col.2, lines 40-41).

As to claims 24,26 and 27, Wang et al teach that the slurry is aqueous slurry (col.1, lines 62-65) and the abrasive particle comprises alumina or silica or ceria (col.2, lines 23-30).

As to claims 32-33, Wang et al teach that the polishing is performed to a metal/dielectric composite (col.1, lines 33-45) but fail to teach the etching ratio of metal relative to the dielectric.

As to claim 37, Wang et al teach that the metal substrate could comprises tungsten or copper or aluminum and dielectric is typically silicon dioxide in a metal/dielectric composite structure (col.1, lines 41-45 and col.4, lines 30-32).

As to claim 38, Wang et al teach that the wafer carrier rotates about 50 rpm and the polishing table with pad rotates about 40 rpm (col.3, lines 23-25).

4. Claims 19-25, 28-31, 34-36 and 39 are rejected under 35 U.S.C. 102(e) as being anticipated by Sakatani (5,804,513).

As to claim 19, Sakatani et al disclose a method for polishing metal using slurry including an abrasive composition comprising an oxidizing agent and abrasive particles (col.4, lines 3-9).

Sakatani et al disclose that the metal substrate is contacted with a polishing pad (col.7, lines 52-57).

Sakatani et al also disclose the pH of the composition is about 7 (col.3, lines 61-63).

Sakatani et al inherently teach that the property of the oxidizing agent such as the static etch rate on metal is less than 1000 Angstrom per hour because the oxidizing agent (iodates) used by Wang et al is exactly similar with the applicant's oxidizing agent.

As to claims 20-21, Sakatani et al disclose that oxidizing agent is preferably used in amount of about 0.5% by weight to about 15% by weight and the abrasive particle is about 5 to about 40% by weight (col.3, lines 42-45 and col.4, lines 12-15).

As to claims 22-23, Sakatani et al teach that the oxidizing agent comprises iodate that broadly includes potassium iodate (col.4, lines 7-9).

As to claim 25, the abrasive particles have a particle size of about 0.1 to about 1.5 micrometer or 100nm to about 1500nm (col.3, lines 39-41).

As to claims 28-31, Sakatani et al teach that organic solvent such as ethanol or methanol is used in the polishing slurry composition for preparing the abrasive suspension (col.4, lines 55-58).

As to claim 34, Sakatani et al teach that polishing of the metal layer is performed immediately preceding the deposition of a dielectric layer (2) (col.1, lines 57-col.2, lines 2).

As to claims 35-36, Sakatani et al teach that an adhesion-promoting layer such as titanium nitride is polished during the polishing process (col.2, lines 1-4).

As to claim 39, Sakatani et al teach that the abrasive particles includes silicon oxide or silica (col.3, lines 30-35).

Conclusion

5. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shamim Ahmed whose telephone number is (571) 272-1457. The examiner can normally be reached on M-Thu (7:00-5:30) Every Friday Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine G Norton can be reached on (571) 272-1465. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

Shamim Ahmed
Examiner
Art Unit 1765

SA
December 20, 2003

ROBERT KUNEMUND
PRIMARY EXAMINER